

WHAT IS CLAIMED IS:

1. A method of generating a reference database for determining a reflectance spectrum, comprising:
 - establishing a plurality of clusters;
 - identifying, for each training sample of a plurality of training samples, a most appropriate cluster among the plurality of clusters and assigning each training sample to the most appropriate cluster, each training sample correlating a reference spectrum with a corresponding plurality of normalized illuminant sensor outputs for reference colors.
2. The method according to claim 1, wherein:
 - the establishing the plurality of clusters comprises establishing a plurality of cluster centroids; and
 - the identifying of the most appropriate cluster comprises obtaining, for each training sample, a Euclidean distance to each of the cluster centroids, wherein the most appropriate cluster is determined to be the cluster associated with the cluster centroid having the shortest Euclidean distance.
3. The method of claim 2, further comprising:
 - obtaining an average distortion based on the shortest Euclidean distance for each training sample;
 - updating the cluster centroids to decrease the average distortion; and
 - re-identifying the most appropriate cluster for each training sample and re-assigning the training samples based on the updated cluster centroids.
4. The method according to claim 1, wherein:
 - the establishing the plurality of clusters comprises establishing a plurality of cluster centroids, the cluster centroids being established through vector quantization.
5. A reference database generated by the method of claim 1.
6. A storage medium on which is recorded a program for implementing the method of claim 1.
7. A method of determining a reflectance spectrum, comprising:
 - obtaining a normalized value from a plurality of illuminant sensor outputs, each illuminant sensor output indicating a reflectance value obtained from a target;

obtaining reference data from a reference database comprising training samples that correlate reference spectra with a corresponding plurality of normalized illuminant sensor outputs for reference colors, the reference database comprising a plurality of clusters, each cluster having a cluster centroid, each one of the training samples being associated with one of the clusters;

determining, for each illuminant sensor output, a Euclidean distance to each cluster centroid;

identifying a most appropriate cluster based on the Euclidean distances, the most appropriate cluster being the cluster corresponding to the shortest Euclidean distance; and

determining a spectrum based on the illuminant sensor outputs and only the reference data from the most appropriate cluster.

8. A storage medium on which is recorded a program for implementing the method of claim 7.

9. A spectral determination system, comprising:

a plurality of illuminants;

at least one photodetector that detects light originating from the plurality of illuminants and reflected by a target; and

a controller that:

obtains a normalized value from a plurality of illuminant sensor outputs, each illuminant sensor output indicating a reflectance value obtained from a target;

obtains reference data from a reference database comprising training samples that correlate reference spectra with a corresponding plurality of normalized illuminant sensor outputs for reference colors, the reference database comprising a plurality of clusters, each cluster having a cluster centroid, each one of the training samples being associated with one of the clusters;

determines, for each illuminant sensor output, a Euclidean distance to each cluster centroid;

identifies a most appropriate cluster based on the Euclidean distances, the most appropriate cluster being the cluster corresponding to the shortest Euclidean distance; and

determines a spectrum based on the illuminant sensor outputs and only the reference data from the most appropriate cluster.

10. A coloring system incorporating the spectral determination system of claim 9.

11. The coloring system of claim 10, wherein the coloring system is one of a digital photocopier and a color printer.

12. The coloring system of claim 10, wherein the coloring system is a xerographic color printer.

13. The coloring system of claim 10, wherein the coloring system is an ink-jet printer.

14. A color detection system incorporating the spectral determination system of claim 9.